TOOL ROOM MGMT & USE OF TMDE

TOOL ROOM MGMT & USE OF TMDE

OVERVIEW:

To provide you with the knowledge on how to determine what support and test equipment you should be maintaining, how to maintain calibration control records, and how to perform advance use of TMDE.

TOOL ROOM MGMT & USE OF TMDE

LEARNING OBJECTIVES:

- TERMINAL LEARNING OBJECTIVES
- ENABLING LEARNING OBJECTIVE

TOOL ROOM MGMT & USE OF TMDE

METHOD/MEDIA:

This class will be taught using the lecture method, aided by a detailed outline, student outline, computer generated slides, a demonstration, and a practical application.

TOOL ROOM MGMT & USE OF TMDE

EVALUATION:

There will be a written examination

at the time indicated on your schedule.

TABLE OF ORGANIZATION

- **The T/O serves as the basic source document for all resources for that particular unit. It contains:**
  - ✓ **Mission statement.**
  - ✓ **Organization.**
  - ✓ **Concept of employment.**
  - ✓ **Administrative capabilities.**
  - ✓ **Logistics capabilities.**

TABLE OF ORGANIZATION CONT..

- Mission statement determines the unit's:
  - ✓ Personnel skills.
  - ✓ Equipment.
  - Resource requirement reviews start w/the mission statement
- Organization paragraph contains a list of the unit's:
  - ✓ Subordinate elements.
  - ✓ Identifies the internal maintenance support and maintenance requirements.

TABLE OF ORGANIZATION CONT.

- Concept of employment is as vital to the CO as it is to the Operations Staff. It determines:
  - ✓ Type of support required
  - ✓ Manner in which that support must be provided.

TABLE OF ORGANIZATION CONT.

- Administration and logistics capabilities specify the following functions authorized to the command:
  - ✓ Administrative.
  - ✓ Supply.
  - ✓ Maintenance.

REVIEW

- We have discussed the Table of Organization.

QUESTIONS??

QUESTIONS TO YOU

Q. What is the purpose of the Table of Organization?

A. **IT PROVIDES AUTHORITY FOR PERSONNEL STAFFING AND SERVES AS THE SOURCE DOCUMENT FOR ALL OTHER RESOURCES.**

TABLE OF EQUIPMENT

- Is a list of equipment that the unit is required to possess and maintain to accomplish their mission.

- When used with the T/O, it serves as a basis for determining:
  - ✓ Publications required.
  - ✓ Additional equipment requirements.

REVIEW

- We have discussed the Table of Equipment.

QUESTIONS??

QUESTIONS TO YOU

Q. What is the purpose of the Table of Equipment?

A. **IDENTIFIES EQUIPMENT THE UNIT IS REQUIRED TO POSSESS AND MAINTAIN IN ORDER TO ACCOMPLISH ITS MISSION; AND WHEN USED WITH T/O, SERVES AS BASIS FOR DETERMINING PUBLICATIONS AND ADDITIONAL EQUIPMENT REQUIREMENTS.**

CONTROL OF SUPPORT/TEST EQUIPMENT

- Identify: Using the unit's T/E and allowance list (special allowance) the MMO, Supply and Maint. officer's can identify all Support and Test Equipment

- Locate: Each item within the unit should be:
  - ✓ Located.
  - ✓ Assigned responsibility for maintaining and accounting.

CONTROL OF SUPPORT/TEST EQUIPMENT CONT.

- INVENTORY: MMO, SupO, RO, Maint. Officer need to match it with the T/E for accountability.
  - ✓ It then needs to be inventoried using the appropriate SL-3, SL-3/Extract, or US Army Supply Catalog.
  - ✓ Common/Special tools must also be inventoried that have been created outside of the T/E.
  - ✓ A copy of all inventories must be maintained per the TM-4700-15/1_, 2-6-1, and local MMSOP.

TYPES OF INVENTORY LISTS

- SL-3-MARINE CORPS STOCK LISTS:
  - ✓ Lists all components of collection-type items (chests, sets, kits, and components) for PEIs such as:
    - Vehicles (“B” kits)
    - TMDE kits (STE-ICE)
  - ✓ Arranged in column form and provides:
    - Identity
    - Type of Issue

TYPES OF INVENTORY LISTS CONT.

- SL-3 EXTRACTS:
  - From the SL-3
  - Locally produced: (i.e. TM-4700-151_, 2-6-2/3)
  - Last page (Signature page)
    - Signature/Date of person inventorying.
    - Signature of person supervising.

- AUTOMATED INVENTORY LISTS:
  - Authorized, provided required information is contained.

REVIEW

- We discussed support and test equipment:
  - ✓ Identifying
  - ✓ Locating
  - ✓ Inventorying

QUESTIONS??

BREAK!!

PREP INSTRUCTIONS

The inventory form must contain the following:

- INVENTORY FOR: Enter noun name.
- EXTRACT OF: Enter publication number and date.
  - ✓Local kits, enter authorizing letter and date.
- TOOL BOX#: Enter number assigned to kit or PEI.

INFO ON INVENTORY

- ITEM NO.: Enter the item number for each item as listed in publication.
  - Components will be listed either:
    - Individually under their parent kit
    - Locally produced SL-3 extract for the kit or set.

- NOMENCLATURE: Enter the nomenclature of item:
  - Entry of NSN will aid in ordering (Optional).

INFO ON INVENTORY CONT.

- U/I: Enter the unit of issue or unit of measure.
- QTY: Enter quantity authorized.
- MONTH: Calendar date inventory was conducted.
  - ✓Use symbols in the legend block.

INFO ON INVENTORY CONT.

- REMARKS: Enter any amplifying comments.
  - ✓ Doc. Numbers
  - ✓ ERO Number
  - ✓ Serial Number of serialized components
- Temporary entries in pencil

INFO ON INVENTORY CONT.

- INVENTORIED BY (SIGNATURE): This signifies that the person inventorying has done a proper inventory.

- SUPERVISED BY: This signifies that the inventory was supervised, conducted, and corrective action has been initiated.

- DATE: Supervisor enters the date.

FILING

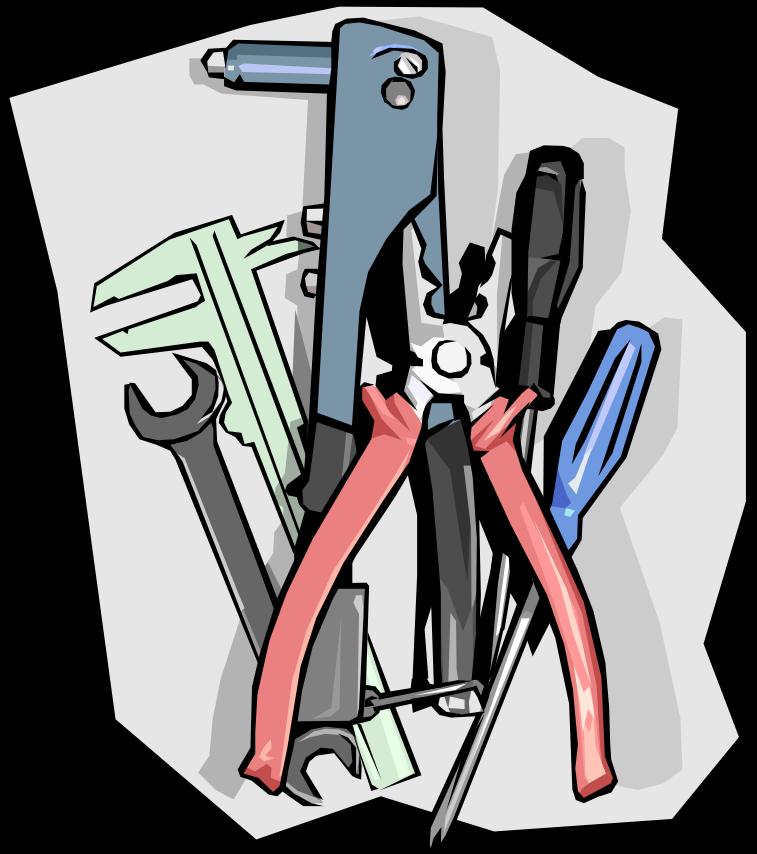
- Maintain a copy of completed record in/with:
  - ✓Tool kit, set, or chest.
  - ✓In file folder.
    - Maintained by Tool Room NCO/Commodity manager in secure area.

DISPOSITION

Completed inventories will be maintained for one year.

EXCESS TOOLS

- Will be rolled back to the supply system per the MCO P4400.150_



CONTROL

- Categories that tool sets, chest, or kits can be placed in, and their required inventory intervals, are as follows:
  - ✓ Issued to individual & securely stored - Semiannually.
    - Duplicate key/combination maintained by the RO.
  - ✓ Issued to RO & Securely stored - Annually.
    - Also inventoried upon change of RO.

CONTROL CONT.

- All Support and Test Equipment will be inventoried using the appropriate form.
- Supply System Responsibility Item (SSRI) and Using Unit Responsibility Item (UURI) requisition per MCO P4400.150_
- Unit’s must budget for tool replacement.

CONTROL CONT.

- SSRI/Basic Issue Items (BII).
  - Items in this category are furnished by the supply system when PEI is:
    - Issued
    - Transferred with PEI during redistribution
    - Other changes of custody unless otherwise specifically directed by appropriate authority.
  - Required to be maintained on hand, ordered, or identified as un-funded deficiency unless specifically directed within SL-3.

CONTROL CONT.

- Requisition of SSRI/BII that need replacement, when PEI is outside stores distribution system, is the owning unit's responsibility.

- PEI's that are components of a PEI (i.e., Gen Mech Tool Box – component of contact truck):

  - ✓ Account for these items under the serial number for the primary NSN. (the contact truck)

CONTROL CONT.

- UURI: Are items that are not issued with the PEI during Initial Issue Provisioning (IIP) and subsequent fielding. Using unit is responsible.
  - ✓ Qty ordered will not exceed stated quantity.
  - ✓ CO can authorize to hold less than stated Qty.
  - ✓ AR (As Required): is the stated Qty, CO must establish such Qty. in writing
    - Must be reviewed and updated at least annually.

CONTROL CONT.

- Items held by the section's tool room for issue to individuals should be maintained in an area secure against pilferage.

- The MMSOP will include a method to account for issues and receipts.
  - ✓ Logbook
  - ✓ Stamped tags
  - ✓ Sign-out cards

REQUISITIONING CONTROL

- Once deficiencies have been identified you must have control over requisitions for those items.
  - ✓ Logbook.
  - ✓ Suspended copies of requisitions.
  - ✓ Reporting unit's demand listing, by supplementary addresses on the requisitions.
  - ✓ Use of DPR using the Cat. Code of "S" on the ERO's, and Appendix "C" of the MCO P4790.2_.

INSPECT

- Despite normal inventory requirements, MMO’s still have a requirement to inspect tools and verify inventory records and requisitions during normally scheduled inspections with a unit.

GARRISON TOOL ALLOWANCES

- FMF unit commanders are authorized to establish, in writing, special tool allowances, provided:
  - ✓Tools are not already maintained within TE

AND

  - ✓Is needed to meet garrison peculiar requirements

OR

  - ✓Is a required, locally fabricated tool

- Authority does not extend below BN/SQDRN level, except for detached units.

GARRISON TOOL ALLOWANCES CONT.

- GARRISON PECULIAR TOOLS: Tools needed to support requirements that would not exist in a deployed situation.
  - Tools required to perform authorized EOM on organic equipment or in support of the T/O mission will be either:
    - T/E items
    - Components of T/E items

GARRISON TOOL ALLOWANCES CONT.

- LOCALLY FABRICATED TOOLS: Tools that are fabricated per the technical publication.
  - ✓ Authorization letter will reference the technical publication which sets the requirement for the tool.

- Prior to submitting for Modification of Allowance (Change to TE) or changes to SL-3/TM, check other PEI/tool kits already in unit's T/E for the required tool.

REVIEW

- We discussed:
  - ✓ Completion, filing, & disposition of inventory forms
  - ✓ Excess tools
  - ✓ Control category assignment
  - ✓ Inspection requirements
  - ✓ Garrison tool allowances

QUESTIONS??

QUESTIONS TO YOU

Q. How many signatures are required on the inventory?

A. TWO

QUESTIONS TO YOU

Q. Tool sets, chest, and kits that are issued to an individual where locks and a secure storage area are provided will be inventoried how often?

A. **SEMI-ANNUALLY**

QUESTIONS TO YOU

Q. How often must “As Required” be reviewed and updated?

A. **AT LEAST ANNUALLY**

EQUIPMENT SL-3/TM COMPONENTS

- Will be accounted for on locally devised inventory sheets.
  - ✓Will be based on the appropriate SL-3 or TM.
  - ✓Will reflect the Serial# of PEI.
  - ✓Will reflect Serial# of serialized components.
- Detailed instructions can be found in the MCO P4790.2_.

EQUIPMENT SL-3/TM COMPONENTS CONT.

- MCO only addresses tool kits, sets, and chests.
- The procedures previously discussed will be used for all SL-3/TM inventories
  - ✓Items used, Semi-Annually.
  - ✓Not used, but stored in secure area, Annually.
  - ✓Upon change over of RO.

REVIEW

- We discussed SL-3/TM components.

QUESTIONS??

QUESTIONS TO YOU

Q. Will items issued to an RO be inventoried upon change of RO?

A. **YES.**

BREAK !!!!

CALIBRATIONS PURPOSE & POLICY

PURPOSE:

- **Test, Measurement, and Diagnostic Equipment (TMDE) Calibration and Maintenance Program (CAMP) was developed to:**
  - ✓ **Provide and maintain prescribed accuracies in standards of measurement**
  - ✓ **Ensure satisfactory performance of all MC TMDE**
- **MCO 4733.1B**

PURPOSE & POLICY CONT.

MARINE CORPS POLICY:

- **Have all TMDE calibrated only to the extent and at intervals necessary to adequately perform the measurements involved.**
- **Accomplish calibration in the most cost-effective manner that satisfies requirements**
- **MC Calibration Facilities (CF).**
  - **Preferred source.**

PURPOSE & POLICY CONT.

- **DEPT OF NAVY POLICY: (SECNAVINST 3960.6)**

1. **Provide organizational, intermediate, and depot maintenance levels with diagnostic capabilities to detect and isolate faults to design.**

2. **To ensure all testing and measurement equipment are maintained at the lowest practical maintenance level.**

PURPOSE & POLICY CONT.

Inter-service calibration support can be used at the discretion of the Commanding Officer.

REVIEW

- We discussed the Marine Corps Calibration Control Program:
  - ✓ Purpose
  - ✓ Policy

QUESTIONS??

QUESTIONS TO YOU

Q. What is the purpose of TMDE CAMP?

A. **TO PROVIDE AND MAINTAIN PRESCRIBED ACCURACIES IN STANDARDS OF MEASUREMENT AND TO ENSURE SATISFACTORY PERFORMANCE OF ALL MARINE CORPS TMDE THROUGHOUT THE FLEET MARINE FORCES.**

QUESTIONS TO YOU

Q. What is the Marine Corps policy on TMDE calibration?

A. **TO HAVE ALL TMDE CALIBRATED ONLY TO THE EXTENT AND AT THE INTERVALS NECESSARY TO ADEQUATELY PERFORM THE MEASUREMENT INVOLVED; AND TO ACCOMPLISH SUCH CALIBRATION IN THE MOST COST-EFFECTIVE WAY THAT WILL STILL SATISFY OPERATIONAL REQUIREMENTS.**

QUESTIONS TO YOU

Q. What is the preferred source for Marine Corps TMDE calibration and maintenance?

A. **MARINE CORPS CALIBRATION FACILITY.**

QUESTIONS TO YOU

Q. Inter-service calibration support can be used at whose discretion?

A. **COMMANDING OFFICER.**

REPONSIBILITIES

- **MCO P4790.2_, Appendix “D” is used to establish and maintain control over calibrations.**

- **Units holding TMDE shall:**
  - ✓ **Submit all TMDE required to be calibrated.**
  - ✓ **Schedule TMDE to allow sufficient amount of TMDE on hand to preclude loss of testing capabilities.**

REPONSIBILITIES CONT.

- ✓ **Ensure TMDE is complete and has proper PMCS performed.**
- ✓ **Ensure TMDE protected during transportation to and from the CF.**
- ✓ **TMDE w/o a Cal. Label shall not be used.**
  - **TMDE received from the supply system with a Cal. Label should not be used until crosschecked with the CF.**

REPONSIBILITIES CONT.

- ✓ **Submit a list of TMDE to the CF that are to be included in the Calibrations Program, if provided by the CF.**
- ✓ **Analyze measurement requirement and request Special Cal. When the full measurement is not being used.**
- ✓ **Request Inactive Labels for TMDE that is not being used.**

REPONSIBILITIES CONT.

- ✓ **Ensure TMDE is used properly to preclude damage.**
- ✓ **Request assistance from the CF for training and proper use of TMDE, as necessary.**

REVIEW

- We discussed the responsibilities of units holding TMDE.

QUESTIONS??

QUESTIONS TO YOU

Q. Calibration control will be established and maintained per what MCO?

A. **MCO P4790.2_, APPENDIX “D.”**

CF RESPONSIBILITIES

- **Intermediate Maintenance Activities will perform repair and calibrations within their authorized level.**
  - **Forward TMDE to higher EOM as necessary.**

RESPONSIBILITIES CONT.

- **Aid in management of the Calibrations program by:**
  - ✓ **Projecting requirements and resources.**
  - ✓ **Identifying need for additional capability.**
- **Provide intra-/inter-service support, commercial contracts, as necessary.**

RESPONSIBILITIES CONT.

- **CF's are designated by HQMC and are authorized necessary equipment to perform cal. and repair. Encl (2) per MCO 4733.1B**

- **Cal. Support is received from MC CF's (ELMACO)**
  - **If no MC facility, Cal. will be done by the local facility (Army, Civilians).**

REVIEW

- We discussed the calibration laboratory responsibilities.

QUESTIONS??

QUESTIONS TO YOU

Q. Can the calibration laboratory provide the using unit intra-/inter-service support and use contracts, as necessary, to satisfy calibration demands?

A. **YES.**

CONTROL PROGRAM

- **IDENTIFY TMDE.**
  - ✓ **Inventory all TMDE to ensure records are accurate & complete, at least annually.**
  - ✓ **T/E, Allowance List, Special Allowances can be used by MMO's and Maintenance personnel to identify what is rated.**

CONTROL PROGRAM

- **FEDLOG also identifies TMDE that requires calibration.**
  - **# 3 under the OTC.**
  - **OTC can be found in the Management View Screen under MGMT CTL data element, 6th position.**
  - **Questions concerning interval or if calibration is required? CONTACT YOUR CAL FACILITY!**

CONTROL PROGRAM

- **LOCATE TMDE.**
  - ✓ **TMDE shall be located. Control System shall identify the section/area the TMDE is being held.**
  - ✓ **During the search of TMDE, keep in mind some items may be components.**

CONTROL PROGRAM

- **INVENTORY TMDE.**
  - ✓ **When all TMDE has been located, MMO and maintenance rep should match the TMDE Control Systems with the T/E, & Unit Allowances to ensure:**
    - **Accountability**
    - **Completeness.**

REVIEW

- We discussed identifying, locating and inventorying items of TMDE.

QUESTIONS??

QUESTIONS TO YOU

Q. How often should units conduct an inventory of all their TMDE?

A. **ANNUALLY.**

BREAK !!!!

CATEGORIES,LABELS,SEALS, & TAGS

- There are four categories of calibration.
- Each TMDE item shall fall into on of these categories and be labeled appropriately.
- TMDE assignment based on:
  - Current use
  - Requirements to task organize, form detachments, or field contact teams.

CATEGORIES,LABELS,SEALS, & TAGS CONT.

- **FULL CALIBRATION.**
  - ✓ **Accurate across its full range of measurement.**
  - ✓ **Label indicates that it is in specifications approved by the MC.**
  - ✓ **Label is Black on White, and comes in three sizes.**

CALIBRATED/FULLY CAL

UNITED STATES MARINE CORPS
CALIBRATION PROGRAM

CALIBRATED

LAB _____

TECH _____

DUE _____

CATEGORIES,LABELS,SEALS, & TAGS CONT.

- **SPECIAL CALIBRATION.**
  - ✓ **Accurate across a portion of its full range of measurement, & CF has been provided with specific ranges.**
  - ✓ **One tag affixed, indicating limitations.**
  - ✓ **Label & Tag is Black on Green, Label comes in three sizes.**

SPECIAL CALIBRATION

UNITED STATES MARINE CORPS
CALIBRATION PROGRAM

SPECIAL CALIBRATED

REFER TO ATTATCHED TAG

LAB _____

DUE _____

SN: 0000-555-0160

CATEGORIES,LABELS,SEALS, & TAGS CONT.

- **CNR.**
  - ✓ **Not used in any Quantitative or Qualitative application.**
  - ✓ **Training only.**
  - ✓ **Unlimited time frame.**
  - ✓ **Will not be calibrated unless requested by the using unit.**
  - ✓ **Label is Orange on White.**

CALIBRATED NOT REQUIRED

UNITED STATES MARINE CORPS
CALIBRATION PROGRAM

CALIBRATION
NOT REQUIRED

LAB _____

TECH _____

DUE _____

CATEGORIES,LABELS,SEALS, & TAGS CONT.

- **NOTE:**
  - **CNR; Not required to resubmit for cal. unless:**
    - **Defective.**
    - **LTI.**
    - **Unit requires status to be changed.**

CATEGORIES,LABELS,SEALS, & TAGS CONT.

- **INACTIVE.**
  - ✓ **Not used and is not expected to be used in the near future.**
  - ✓ **Must be calibrated prior to use.**
  - ✓ **Must be reviewed every three years.**
  - ✓ **Still not expected to be used, unit should consider requesting a change in T/E.**

CATEGORIES,LABELS,SEALS, & TAGS CONT.

- **Units shall request Inactive & CNR labels from the CF by Naval letter or directly. Requirements for ltr:**
  - ✓ **Model Number/Nomenclature.**
  - ✓ **Serial number.**
  - ✓ **Cal. due date.**
  - ✓ **Barcode**
  - ✓ **Exact label desired.**

CATEGORIES,LABELS,SEALS, & TAGS CONT.

- ✓ **CF shall maintain letter for a minimum of 3 years.**
- ✓ **Item not currently calibrated or operational, must be submitted for full operational check.**
- ✓ **Inoperative, submit for repair.**
- ✓ **Label is Green on White.**

INACTIVE

UNITED STATES MARINE CORPS
CALIBRATION PROGRAM

INACTIVE

CALIBRATE BEFORE USE

LAB TECH _____

_____

DUE _____

ENCLOSURE (1)

FLOW CHART

CATEGORIES,LABELS,SEALS, & TAGS CONT.

- **REJECTED LABEL.**
  - ✓ **Item returned to unit for failure to meet criteria.**
  - ✓ **Tag shall remain on item till repaired or calibrated.**
  - ✓ **Tag and Label are Black on Red.**

REJECTED

UNITED STATES MARINE CORPS
CALIBRATION PROGRAM
REJECTED

(REFER TO ATTACHED TAG)

LAB TECH _____

DUE _____

CATEGORIES,LABELS,SEALS, & TAGS CONT.

- **CALIBRATION VOID IF SEAL BROKEN LABEL.**
  - **Purpose. Increase confidence in the reliability of TMDE which has a label affixed to it.**
  - **Broken seal may indicate that the item may have been tampered with and calibration is questionable.**
  - **Label is Red on White.**

SEALS

CALIBRATION VOID IF SEAL IS BROKEN

MARINE CORPS CALIBRATION PROGRAM

CATEGORIES,LABELS,SEALS, & TAGS CONT.

- **REMOVAL.**
  - **Calibration facility are the only ones authorized to remove tags.**
    - **Except for units that are provided CNR and INACTIVE labels.**

SCHEDULING PROCESS

- **PURPOSE: To establish due dates for all TMDE.**
- **When scheduling, units must ensure that enough assets are on hand for day-to-day operations.**
- **Scheduling is AUTOMATIC.**
  - **Next Cal. due date is the date on the label.**
- **Turn in TMDE promptly when due.**
  - **Exceptions are as follows:**

SCHEDULING PROCESS CONT.

- **Exceptions.**
  - ✓ **Repair**
  - ✓ **Receipt of new equipment.**
  - ✓ **Training exercise.**
  - ✓ **Several items of the same type due at the same time.**
  - ✓ **Training or actual commitments, may need to change scheduling.**
  - ✓ **May be mission essential, or replacement has been delayed in its return from the CF.**

SCHEDULING PROCESS CONT.

- The exceptions and poor management can cause uneven scheduling.
- Unit may have a reduced capability to perform its mission having s specific item due at the same time.
- Even spread is required.

CONTROL OF TMDE

- **CO will designate in the MMSOP which of the two manual control systems will be used.**
- **Units are authorized to use an automated system.**
  - **Basic data in the manual systems must be included in this system.**

CONTROL OF TMDE CONT.

- MMSOP will also state process for opening ERO and Evacuation of TMDE to Cal. Facility.
- The calibration control system chosen by the unit may be maintained:
  - ✓ Centrally for whole unit.
  - ✓ Decentralized within each commodity area.

CALIBRATION PROCESS

- By due date remove from working area.
- Identify extent of calibration on ERO or WON/Task.
- Unit will have a ERO or WO initiated for all TMDE due calibration.

CALIBRATION PROCESS CONT.

- **Preparation of ERO for induction to the CF is optional IAW TM-4700-15/1_, Pg 2-2-1, par. (3)(a)**
  - ✓ **Preparing a 2nd EOM ERO is optional when transporting TMDE into the Calibration Lab.**

CALIBRATION PROCESS CONT.

- **Units normally collect TMDE 2 to 4 times a month, depending on:**
  - ✓ **Location**
  - ✓ **Number of items due**
  - ✓ **Need of equipment.**
- **TMDE goes to processing area AWTG EVC, and may exceed due date.**
  - ✓ **Time AWTG EVC kept to a minimum, and no longer than 15 days past due date.**

CALIBRATION PROCESS CONT.

- **TMDE will be evaluated at least annually to:**
  - ✓ **Ensure correct category assignment (consistent with mission).**
  - ✓ **Determine if TMDE is required or not required.**

CALIBRATION PROCESS CONT.

- Control record should contain ERO# which inducts item into the CF.
- Item returns from the CF, control point shall update control record with new due date IAW TM-4700-15/1_.

INSPECT

- **During normal internal inspections within a unit, MMO and Maintenance Officer's/Commodity managers must ensure all TMDE items are:**
  - ✓ **Labeled**
  - ✓ **Within calibration intervals.**

PM REQUIREMENTS

- **Organizational PM. (Requires no scheduling)**
  - ✓ **Clean (Clean air filters, charged batteries, etc.)**
  - ✓ **Complete (Inventoried, if applicable)**
  - ✓ **Missing components, have valid requisition.**
  - ✓ **Operational check IAW TM.**
- **INACTIVE, remove batteries.**

PM REQUIREMENTS CONT.

- **Intermediate PM. (Requires no scheduling)**
  - ✓ **Performed by the Intermediate level.**
  - ✓ **Some units are authorized.**
  - ✓ **Normally conducted during calibration.**

REVIEW

- We discussed:
  - ✓ Categories, labels, seals, & tags
  - ✓ Scheduling of TMDE
  - ✓ Calibration control systems
  - ✓ Calibration process

QUESTIONS??

QUESTIONS TO YOU

Q. What are the four categories of calibration?

A. **FULL, SPECIAL, CALIBRATION NOT REQUIRED, AND INACTIVE.**

QUESTIONS TO YOU

Q. How often must units review items designated as “INACTIVE?”

A. **EVERY THREE YEARS.**

BREAK !!!!

GET OUT YOUR NAVMC 11052

PREPARATION OF CALIBRATION CONTROL SYSTEMS

- **CARD INDEX SYSTEM.**
  - **Best suited for units with large quantities of TMDE.**
    - **Provides historical data.**
  - **Prepare a NAVMC 11052 for each item of TMDE using the annual inventory.**

INSTRUCTIONS CARD INDEX SYSTEM CONT.

- **Card Index System. Prepare a NAVMC 11052 on each TMDE and enter the following:**
  - ✓ **Nomenclature. (“Item”)**
  - ✓ **Serial Number. (“Serial No.”)**
  - ✓ **ID Number. (“Identification No.”)**
  - ✓ **NSN. (“NSN”)**
    - **If item is a component, enter end item Nomen., ID#, Serial# in the “Location/Component of” block.**
    - **If item is the end item, enter the actual location in “Location/Component of” block.**

INSTRUCTIONS CARD INDEX SYSTEM CONT.

- **Date Calibration/PM Due.**
  - ✓ Enter the date on the label that is affixed to the item.
  - ✓ If never been calibrated, submit it.
  - ✓ Items w/ Inactive or CNR enter date of the next validation is due.

- **Date Calibration/PM Performed.**
  - ✓ Inactive or CNR enter the date validation occurred.
  - ✓ Other categories this field is optional.

INSTRUCTIONS CARD INDEX SYSTEM CONT.

- **Remarks: Use this column as follows:**
  - ✓ **Indicate CNR or INACTIVE and date.**
  - ✓ **Indicate Special Calibrations, and its requirement for this conditions.**
  - ✓ **ERO, Doc,Voucher number in pencil for items inducted.**
  - ✓ **Location of item deployed.**
  - ✓ **Additional information.**

- **TM-4700-15/1_, pg. 2-7-4 provides instructions.**

ITEM	SERIAL NO.	IDENTIFICATION NO.
WRENCH, TORQUE	12345678	00054C

NSN	LOCATION/COMPONENT OF
2530-01-478-7521	BLDG. 1134/TOOL ROOM

DATE CALIBRATION/PM DUE	DATE CALIBRATION/PM PERFORMED	REMARKS
	02 JUN 93	ERO# XB115 FULL CAL.
02 JUN 94	10 FEB 94	CNR 10 FEB 94
10 FEB 95	10 FEB 95	CNR 10 FEB 94
10 FEB 96	10 FEB 96	CNR 10 FEB 94
10 FEB 97	28 MAY 96	ERO# XB200 FULL CAL
28 MAY 97		

CALIBRATION CONTROL CARD: (4790)
NAVMC 11052 (REV. 3-84) *(8-79 edition will be used)*
SN: 0000-00-006-7641 U/I: PG OF 100

(SEE INSTRUCTIONS ON REVERSE)

INSTRUCTIONS CHART AND AUTO SYSTEM CONT.

- **Chart System. Can be made a wall chart or standard size paper.**
  - ✓ **Must have all info pertaining to the TMDE.**
- **Automated Calibration System. Units are authorized to use this system as long as all info required for the manual system are incorporated.**

REVIEW

- We discussed preparation instructions for calibration control systems.

QUESTIONS??

BREAK !!!!

DEMONSTRATION

REVIEW

- We have:
  - ✓ Discussed preparation instructions for calibration control systems.
  - ✓ Observed a demonstration

PRACTICAL APPLICATION

REVIEW

- You have performed a practical application to develop proficiency.

QUESTIONS??

BREAK !!!!

REVIEW

- During this period, we have:
  - ✓ Discussed preparation instructions
  - ✓ Observed a demonstration
  - ✓ Performed a practical application

QUESTIONS??

QUESTIONS TO YOU

Q. What are the three calibration control systems that can be used?

A. **CARD, CHART, AND AUTOMATED.**

QUESTIONS TO YOU

Q. Are automated systems authorized in lieu of manual methods?

A. **YES.**

FILING & DISPOSITION

- **Shall be maintained centrally or decentralized to each section. MMSOP will dictate how this done.**
  - ✓ **Retain as long as item is held by the unit.**
  - ✓ **Destroy or delete, when item is no longer held.**

REVIEW

- During this period, we have discussed filing and disposition of calibration control records.

QUESTIONS??

QUESTIONS TO YOU

Q. How long are calibration control records retained?

A. **FOR AS LONG AS THE UNIT HOLDS THE EQUIPMENT.**

ADMINISTRATIVE REMARKS

- If units have a centralized TMDE center, it is advisable that each section still establish their own control system.

- Card, Chart, or Automated may be used.
  - If they are duplicate they must be accurate.

NEW ITEMS OF EQUIPMENT

- Requirements for new items should be determined upon receipt.
- If item is totally new, requirements can be obtained from the Cal. Lab.
  - In either case they need to be submitted to the Cal. Lab.
- If not required or put in a Inactive status, the appropriate labels will come from the Cal. Facility.

UNSERVICEABLE EQUIPMENT CONT.

- If item is declared unserviceable or beyond repair and recoverable item report has been submitted.
  - ✓ Delete entry or pull file card.
  - ✓ Order new item IAW supply procedures.
  - ✓ If item is a component, indicate in the remarks section and identify the end item.
    - Ensure component is requisitioned.

ENCLOSURE (2)

FLOW CHART

REVIEW

- During this period, we have discussed administrative remarks associated with TMDE CAMP.

QUESTIONS??

QUESTIONS TO YOU

Q. Can a new item of TMDE be used prior to being crosschecked with the Calibration facility?

A. **NO.**

TMDE

- Any tool or equipment that measures quantitative or qualitative amounts.


Questions?

Check on Learning

- Q. What is TMDE?
- A. **Any tool or equipment that measures quantitative or qualitative amounts.**

VADS

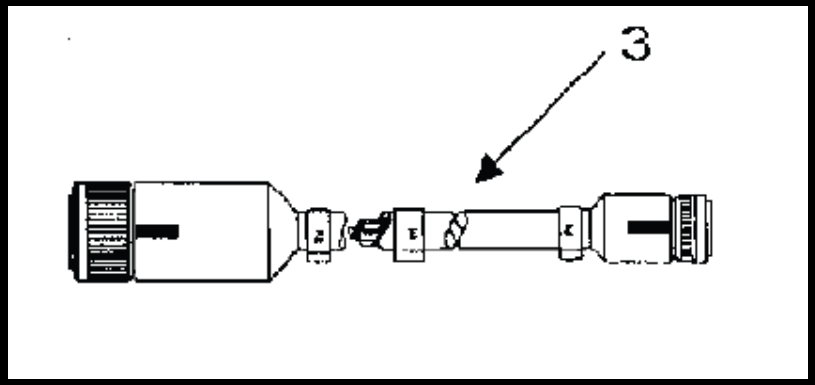
- The VADS is a lightweight portable diagnostic system of modular design that is used to perform intrusive diagnostics on diesel engines, transmissions, central tire inflation systems, and other mechanical, electrical and hydraulic systems via an Interactive Electronic Technical Manual (IETM) or other testing software interface, using the vehicle diagnostic interfaces.
- The primary component of the VADS is the Test Adapter Vehicle (TAV), which is interfaced with an IBM compatible personal computer or laptop controller with available serial port, CD-ROM drive, and Microsoft Windows operating systems.

TEST EQUIPMENT AND DIAGNOSTIC EQUIPMENT

- VADS (Analyzer Set, Vehicle) comes with:
  - 2 weather resistant cases containing:
    - Complete set of interconnect cables
    - Transducers/adapters and probes

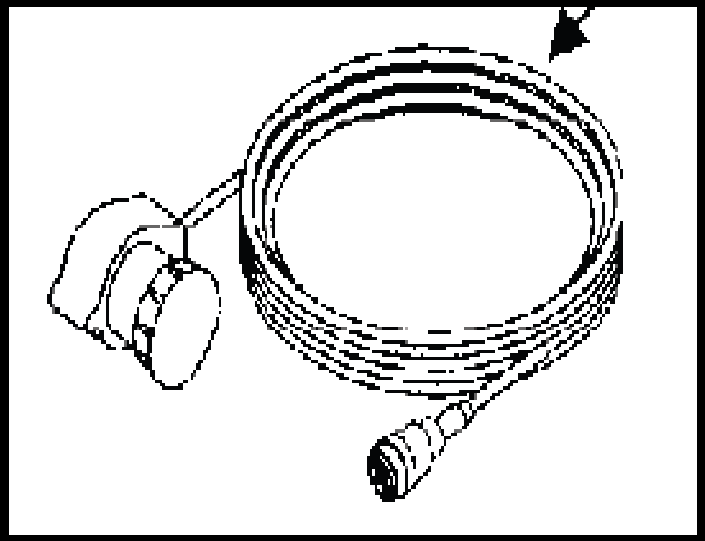
TEST EQUIPMENT AND DIAGNOSTIC EQUIPMENT

- Diagnotstic Connector Assy (DCA)
  - Connects VADS to vehicle
  - May be used to carry signals from vehicle under test to VADS
  - May act as a power cable.



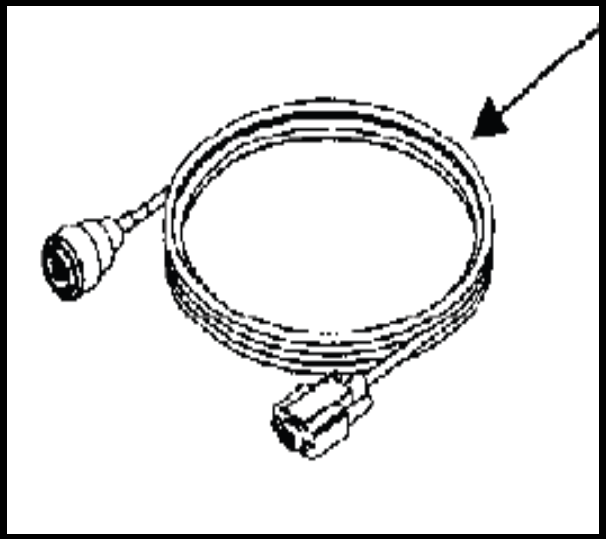
TEST EQUIPMENT AND DIAGNOSTIC EQUIPMENT

- NATO Power Cable
  - Provides power to the VADS.
  - Not used when DCA is acting as power cable.



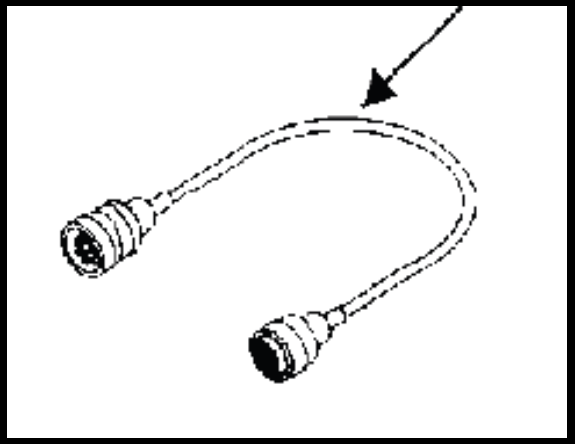
TEST EQUIPMENT AND DIAGNOSTIC EQUIPMENT

- RS-232 Serial Cable
  - Connects serial port of computer to serial port of VADS Test Adapter Vehicle (TAV).
  - Enables signal and data flow between computer and TAV.



TEST INSTRUMENT AND DIAGNOSTIC EQUIPMENT

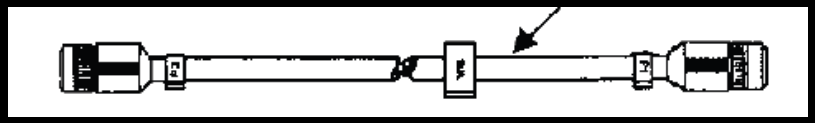
- Databus Cables
  - Connects TAV to vehicle equipment with databus capability.



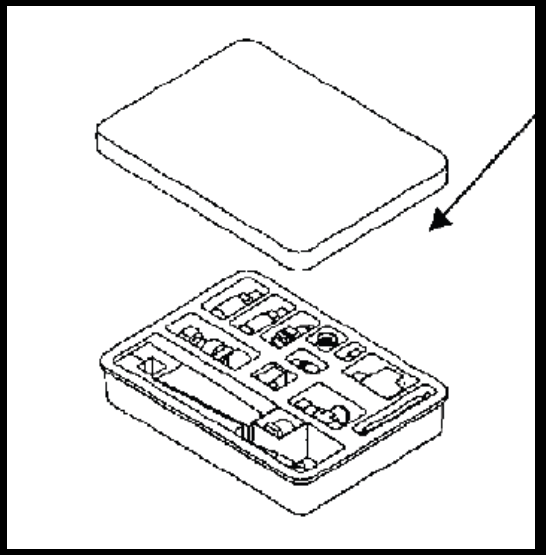
DIAGNOSTIC EQUIPMENT

- Transducer Cable and Internal Combustion Engine (ICE) Test Adapter Set
  - Connects ICE Test Adapter to TAV to collect various test data.
  - Based on type of vehicle under test and the type of test being conducted.

Transducer Cable

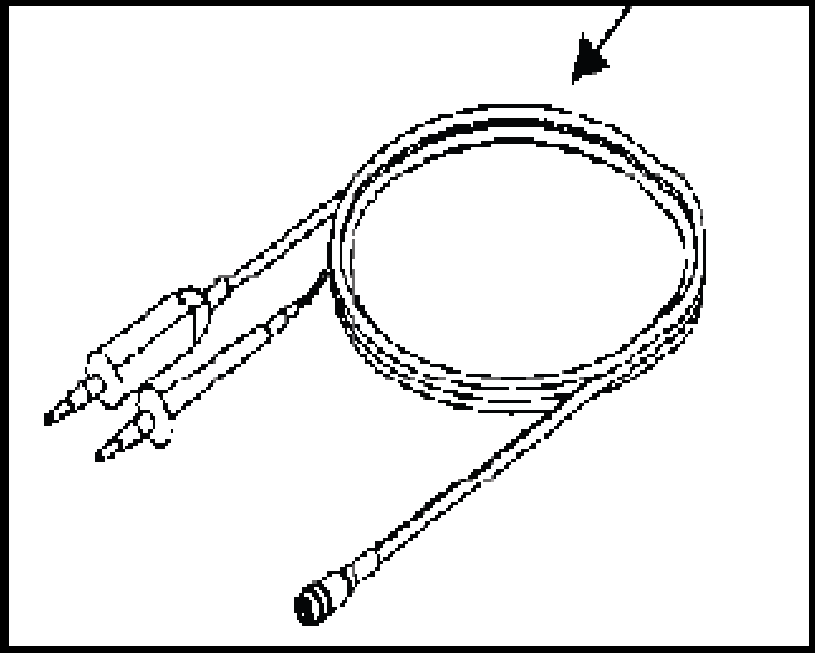


Internal Combustion Engine (ICE) Test Adapter Set



TEST EQUIPMENT AND DIAGNOSTIC EQUIPMENT

- Volt-Ohm Probe
  - Used to collect electrical data and connected directly to the TAV.



TEST PERSONNEL AND DIAGNOSTIC EQUIPMENT

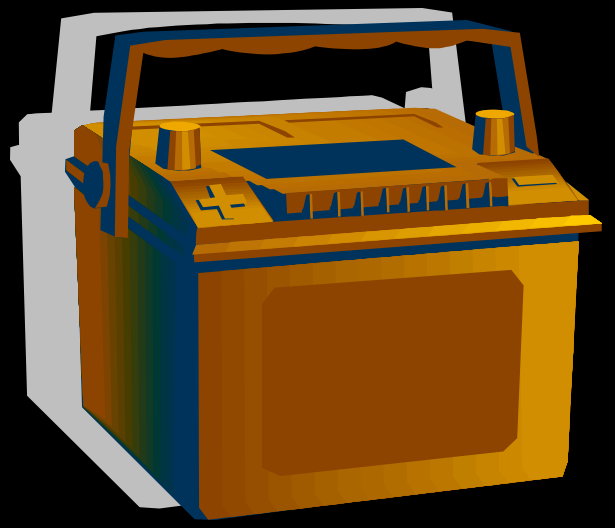
- Controls
  - A double-throw power switch located on the left side of the TAV.
  - Pull switch out and down if powering through the DCA .
  - Pull switch out and up if powering through the NATO cable.

TEST EQUIPMENT AND DIAGNOSTIC EQUIPMENT

- Indicators.
  - A red (PWR) indicator, will light when power is applied.
  - Green (RDY) indictor, will light after the TAV completes the power-up and self-test.
    - Green (RDY) indicator may blink or flicker during operation.

DIAGNOSTIC EQUIPMENT

- Start up Procedures
  - Ensure that tractor battery gauge indicates sufficient power to run VADS.
  - 18 – 36 v in DCA mode
  - 10 – 36 v in NATO mode.



TEST EQUIPMENT AND DIAGNOSTIC EQUIPMENT

- Connect appropriate power cable
  - If using the NATO power cable:
    - P2 to TAV J5 and P1 to vehicle slave receptacle

NATO Power Cable

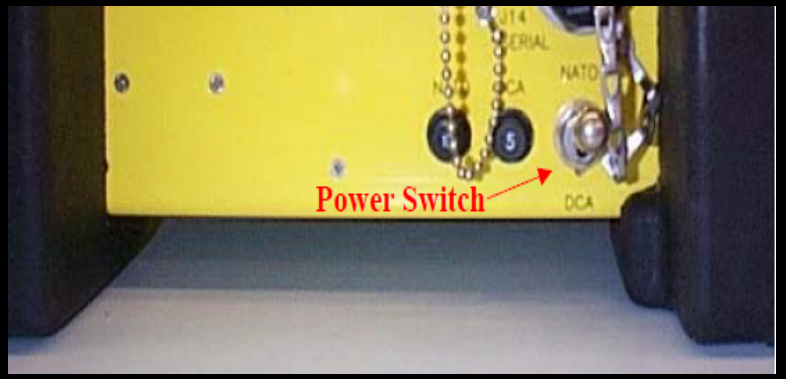
TEST EQUIPMENT AND DIAGNOSTIC EQUIPMENT

- Connect appropriate power cable
  - If using the DCA as a power cable:
    - P1 to TAV J1 and P2 to vehicle DCA connector.

DCA Cable

TEST EQUIPMENT AND DIAGNOSTIC EQUIPMENT

- Apply power to the TAV
  - Out and up or out and down.
- The TAV will perform an internal self-test
  - When TAV completes self-test, the green indictor (RDY) will light.



TEST EQUIPMENT AND DIAGNOSTIC EQUIPMENT

- Operating Procedures.
- Connect TAV RS232 serial cable:
  - P2 to computer serial port and P1 to TAV J14.

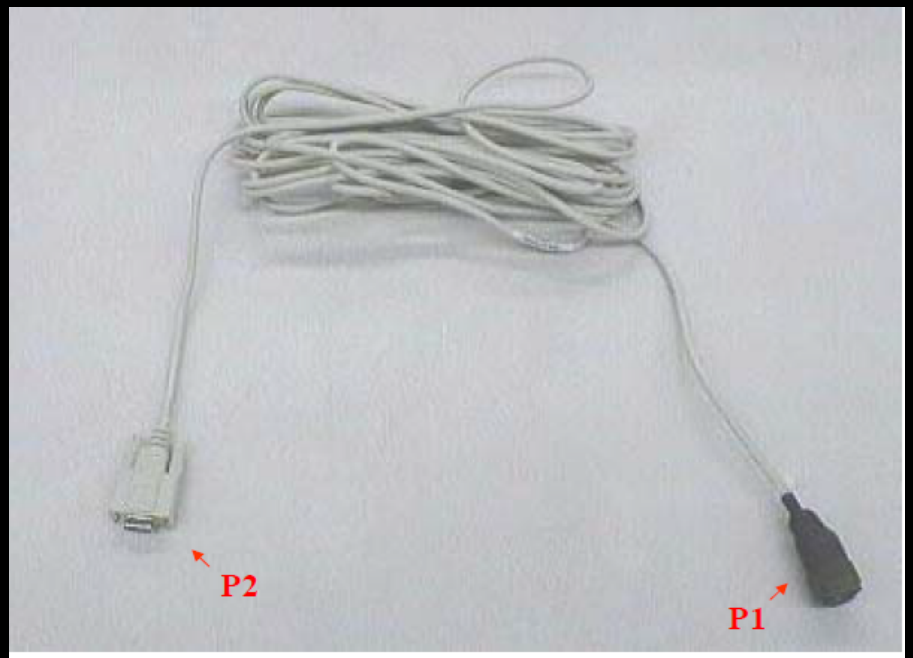


Figure 2-3. RS232 Serial Cable

TEST EQUIPMENT AND DIAGNOSTIC EQUIPMENT

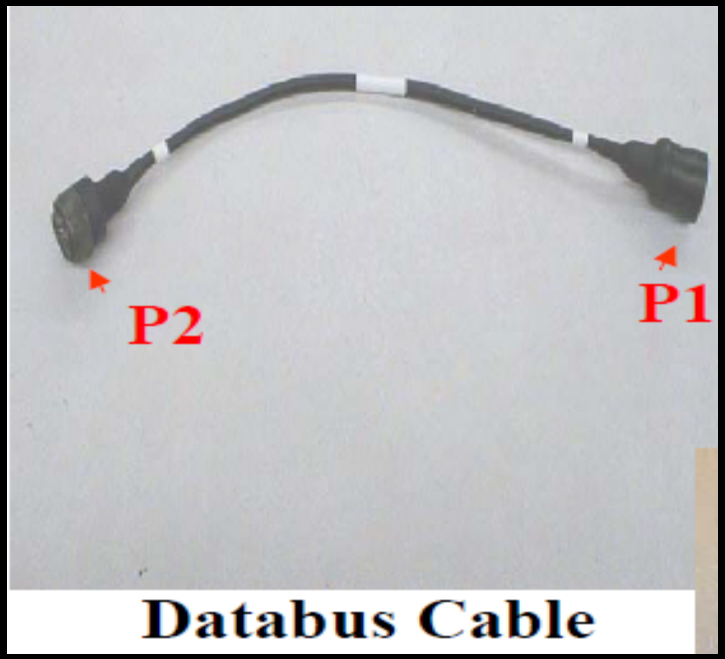
- Operating Procedures.
- Turn on computer.
  - When finished booting up and Windows is operating,
  - Select “Start” by clicking the mouse or by using the touch screen.

TEST EQUIPMENT AND DIAGNOSTIC EQUIPMENT

- Operating Procedures.
- Select the appropriate Interactive Electronic Technical Manual (IETM)
- Follow the setup and testing procedures provided on the display.
- IETM testing procedures must be followed exactly as presented!!
- Failure to follow testing procedures may cause VADS software to malfunction!!

TEST EQUIPMENT AND DIAGNOSTIC EQUIPMENT

- Operating Procedures.
- Connect the following as appropriate for the test being performed:
- Databus Cable: P1 to TAV J6 and P2 to vehicle Data Bus connector.



TEST EQUIPMENT AND DIAGNOSTIC EQUIPMENT

- Operating Procedures.

- Volt-Ohm Probe: P1 to TAV J4.

TEST EQUIPMENT AND DIAGNOSTIC EQUIPMENT

- Operating Procedures.

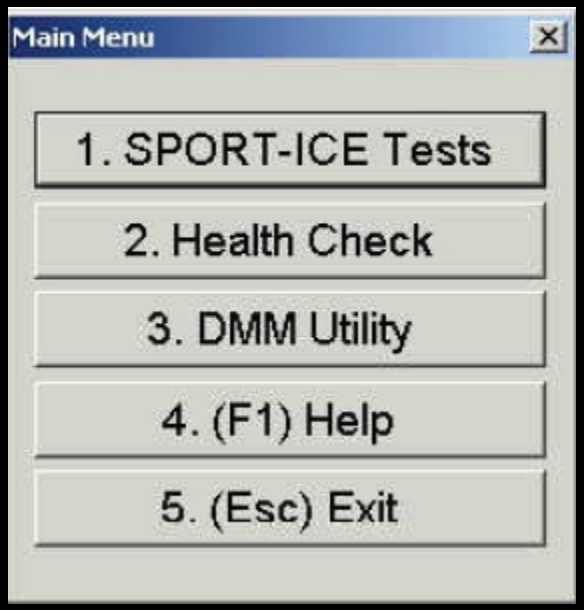
- Transducer Cables: P1 to TAV J2/J3 and P2 to appropriate transducer.

Transducer Cable

TEST EQUIPMENT AND DIAGNOSTIC EQUIPMENT

- Operating Procedures.
- If no IETM is available for a particular test vehicle, you may use the VADS software
- Select the VADS software from the Microsoft Windows operating system.
- Select VADS as the testing system, and then select SPORT-ICE Tests.

VADS Software Main Menu



TEST EQUIPMENT AND DIAGNOSTIC EQUIPMENT

- Operating Procedures.
- ICE Tests
  - Conducts a variety of interactive tests based on test vehicle selection.
  - A selectable list of available tests is presented to the operator.
  - VADS has the capability to run two complementary tests simultaneously.

TEST EQUIPMENT AND DIAGNOSTIC EQUIPMENT

- Operating Procedures.
- Health Check
- After entering vehicle and operator's data, performs four groups of tests automatically.
  - Engine off, engine cranking, engine idling, and engine at full throttle.
  - Test vehicle must be equipped with DCA capability to run Health Check.

TEST EQUIPMENT AND DIAGNOSTIC EQUIPMENT

- Operating Procedures
- Digital Multi-Meter (DMM Utility)
  - Displays electrical data as a Digital Multi-Meter.
  - Electrical measurements are taken by the Volt-Ohm Probe.

TEST EQUIPMENT AND DIAGNOSTIC EQUIPMENT

- Operating Procedures
- (F1) Help.
  - Provides a help menu for the VADS software.
- (Esc) Exit.
  - Exits VADS software and returns to the Microsoft Windows desktop.
- VADS software must be used in conjunction with the technical manuals to confirm specific test measurement parameters.

TEST EQUIPMENT AND DIAGNOSTIC EQUIPMENT

- Power-Down Procedures
- Shut down the TAV by pulling and positioning the power switch to the center position.
- Remove all test cables.
- At the end of the session, exit application IETM.

NOTE:

- Do not hook VADS up to NMCI assets!

TEST MEASURE AND DIAGNOSTIC EQUIPMENT Troubleshooting

- **RED INDICATOR (PWR) FAILS TO LIGHT IMMEDIATELY WHEN POWER IS APPLIED**
- Turn off power to the TAV.
- Check 10 amp NATO and 5 amp DCA circuit breakers to ensure they are properly engaged.
- Check power cable and ensure cable is correctly installed and making good connection to the TAV and to the power source.
- Re-check test vehicle battery/voltage gauge for sufficient power to run VADS.
- Reapply Power-up Procedures If Red Indicator (PWR) fails to light - Return VADS for repair.
-
-
-

TEST MEASURE AND DIAGNOSTIC EQUIPMENT
Troubleshooting

- Green Indicator (RDY) Fails to Light After Power is Applied to the TAV and 5 Minutes Have Passed.
  - Turn off power to the TAV. Leave power off for at least 30 seconds. Rapid cycling of power switch may cause power-up failure or improper operation
  - Reapply power-up procedures (Paragraph 2.2 a). If green indicator (RDY) fails to light, return VADS for repair

DIAGNOSTIC EQUIPMENT Troubleshooting

- "Read Timeout" or Other Error Message(s) Occurs While Performing Diagnostics Via IETM or ICE Software.
  - Make sure the RS-232 serial cable is securely connected from the laptop to the TAV
  - Check COM port setup within the Mircrosoft Windows operation system for proper configuration
  - Verify test software is properly configured for the test hardware and COM port
  - Reboot laptop and the TAV following proper power down and power up procedures

BREAK!!!

Demonstration

Practical Application

Check on Learning

- Q. What is the primary component of the VADS?
- A. **The Test Adapter Vehicle (TAV).**
- **Q.** What cable do you connect to the computer?
- A. **TAV RS232 serial cable.**

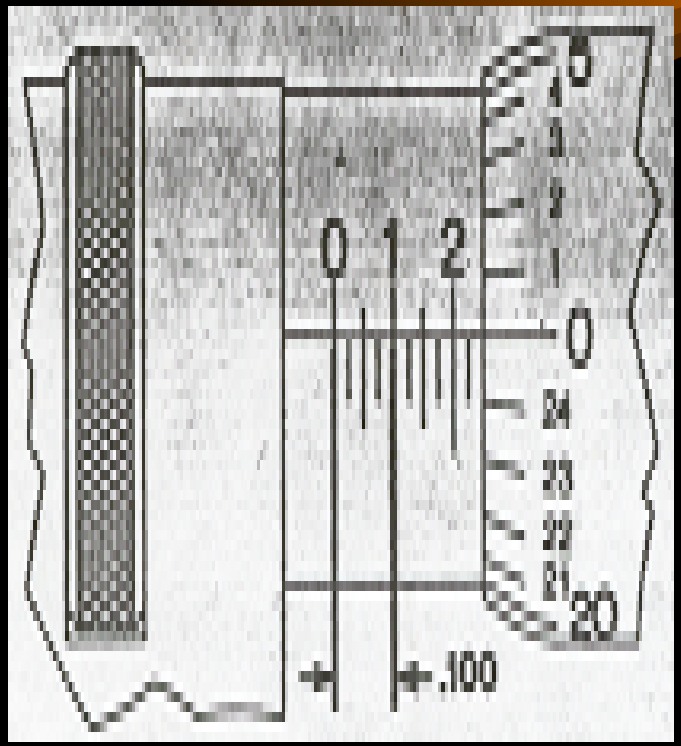
Take 10!!!

MICROMETERS

- Micrometers use the principle of a screw to amplify small distances.
  - Large scale to a smaller scale to a smaller scale. (Tapered down to finite measurements)
- **Outside micrometer** typically used to measure shafts and blocks.
- **Inside micrometer**, used to measure the diameter of holes. (Cylinders)
- **Depth micrometer**, measures depths of slots and steps.

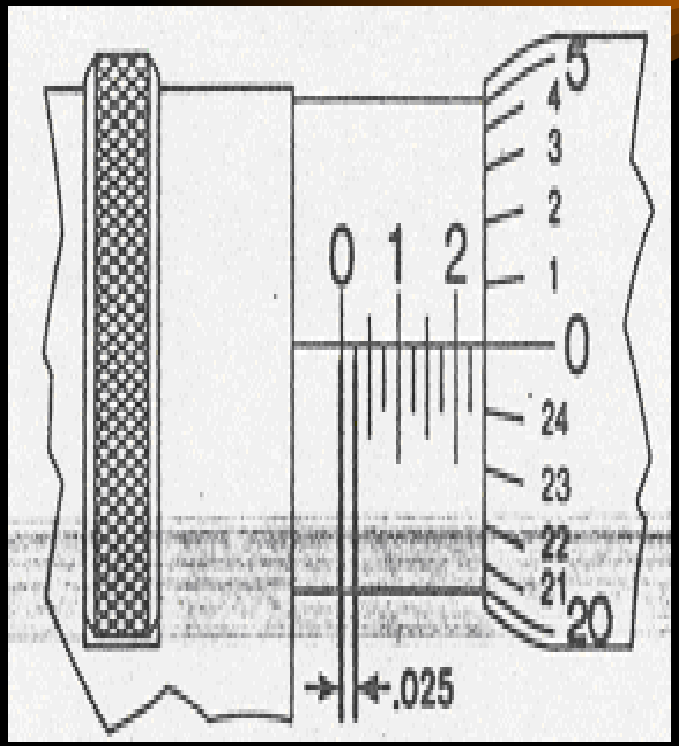
MICROMETERS

- Each number on the sleeve of the micrometer represents 1/10 of an inch or .100”



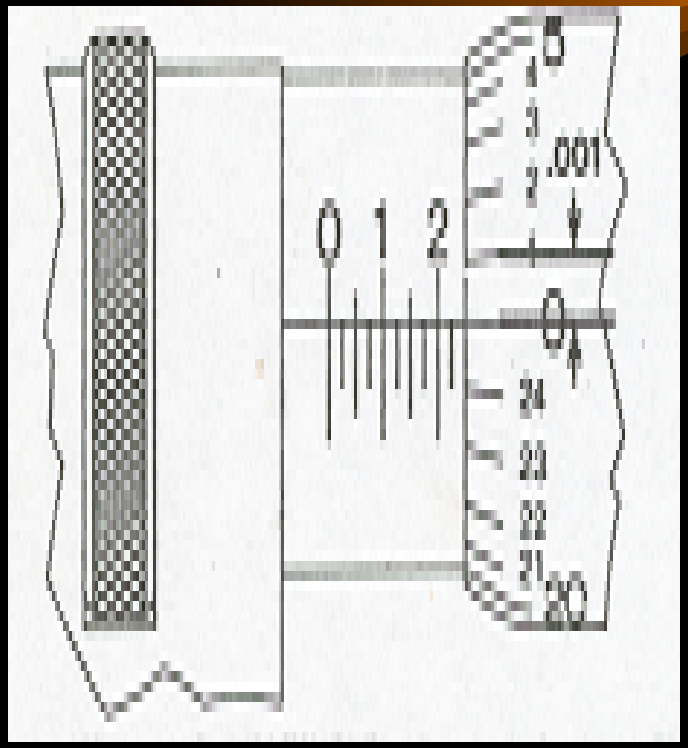
MICROMETERS

- Each of the four equal spaces between each number represents ¼ of .100” or . 025”. One complete revolution of the thimble changes the reading one space on the



MICROMETERS

- The beveled edge of thimble is divided into 25 equal parts, each space representing 1/1000 of an inch or .001”(One thousandth of an inch.)

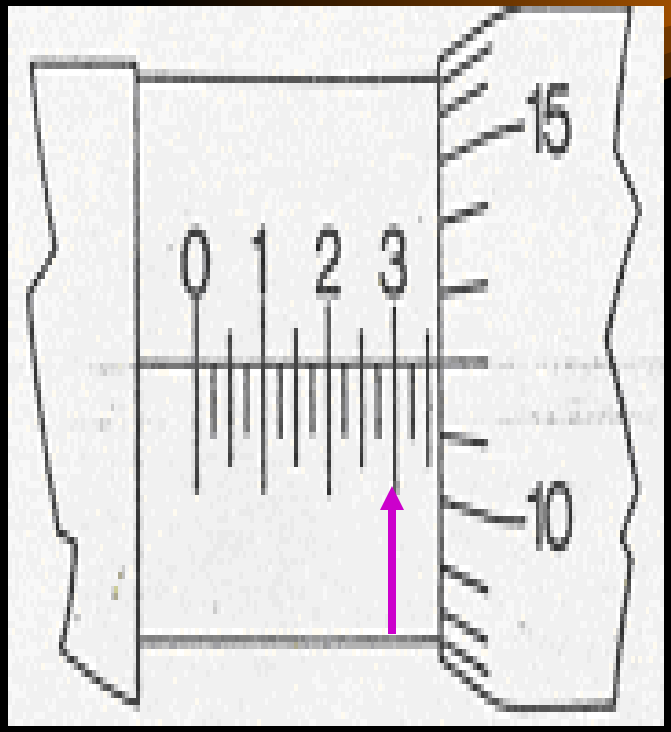


MICROMETERS

- The step by step process of taking a micrometer reading involves the addition of three separate readings which are obtained as follows:

MICROMETERS

- First, read the largest number on the sleeve that has been uncovered by the thimble-it is 3, which means you have .300” to start with.



.300 Largest number on sleeve

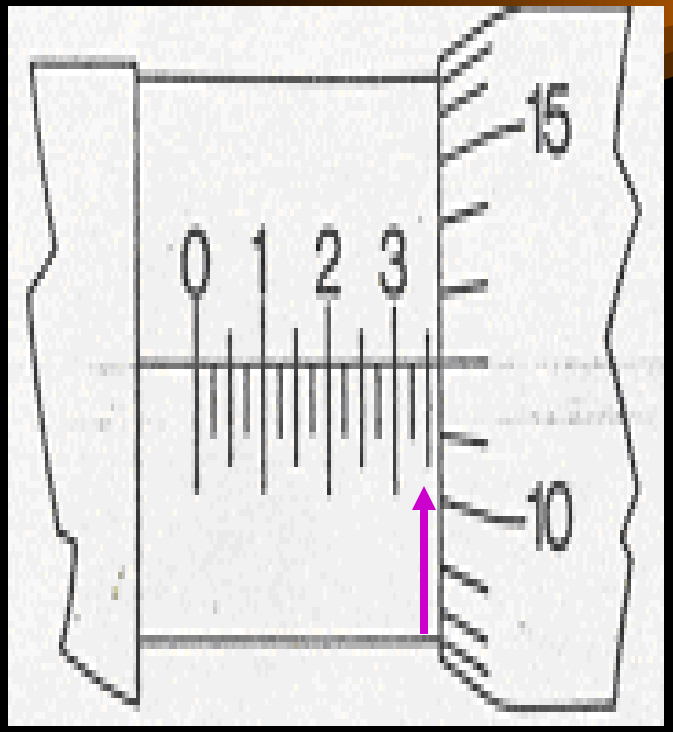
000

000

.300 Total

MICROMETERS

- Second,count the number of lines that the thimble has uncovered past the 3-it is 2, and since each space is equal to .025, 2 spaces will equal 2x.025”or .050”, to be



.300 Largest number on sleeve

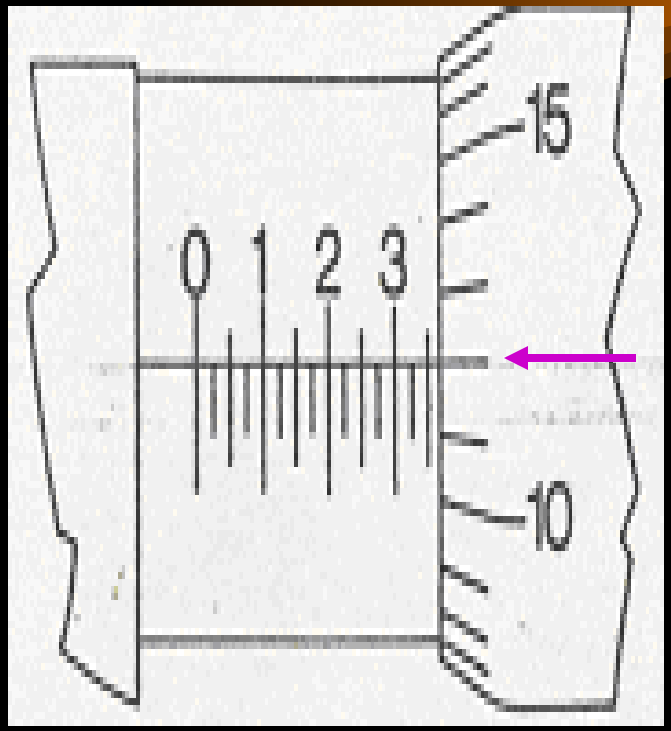
.050 Two lines past largest number

000

.350 Total

MICROMETERS

- Third,the graduations on the thimble show that it has revolved 12 spaces beyond the 0 mark, which means that .012” this must also be added to the total.

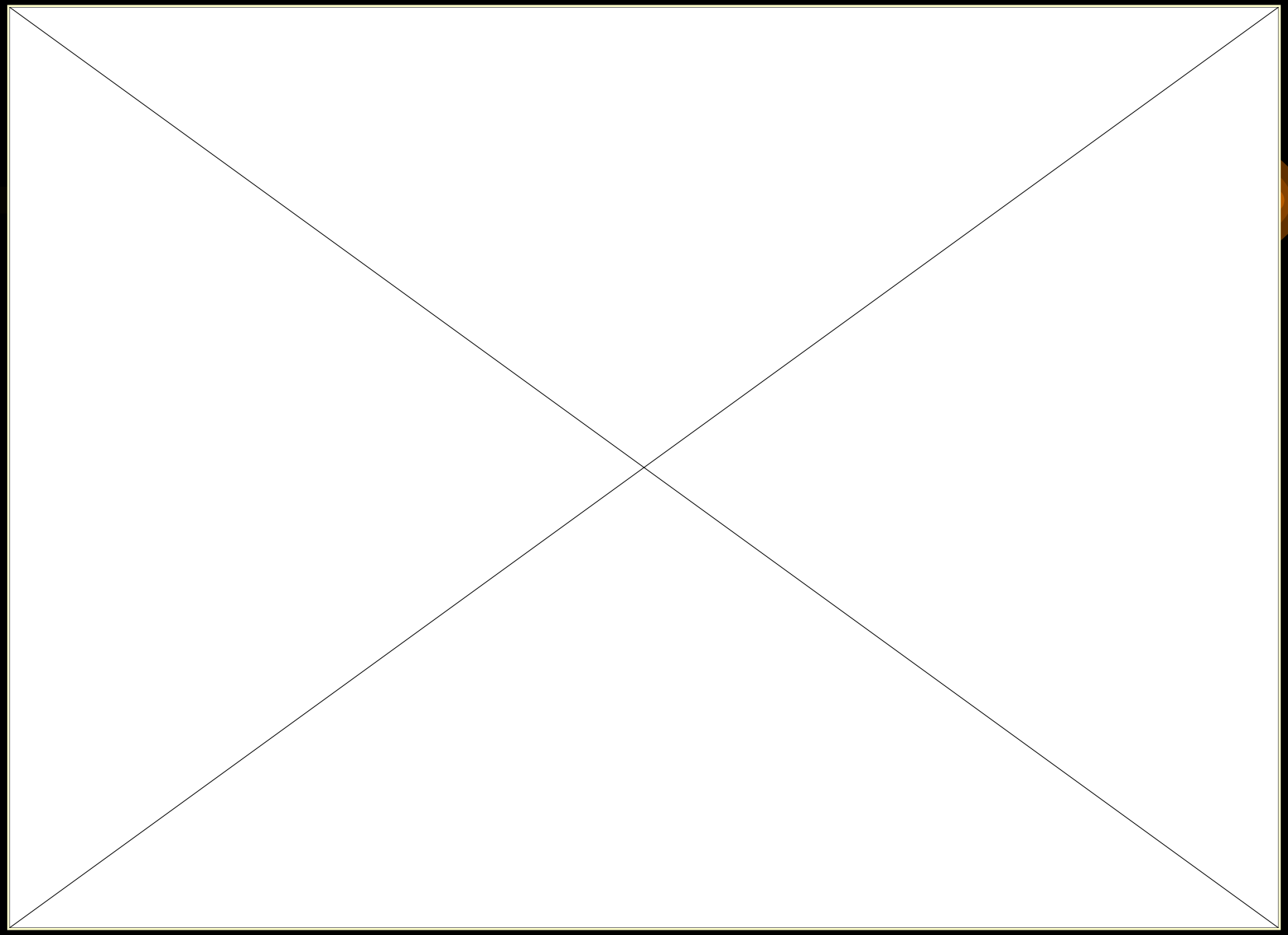


.300 Largest number on sleeve

.050 Two lines past largest number

.012

.362 Total



MICROMETERS

DEMONSTRATION

MICROMETERS

PRACTICAL APPLICATION

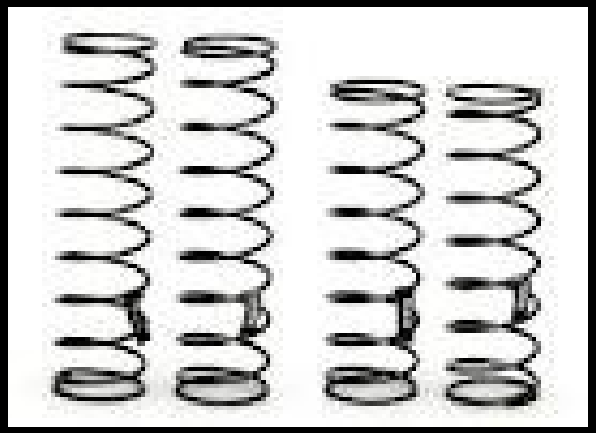
BREAK!!

Check on Learning

- Q. Each number on the sleeve of the micrometer represents what?
- A. **1/10 of an inch or .100.**
- **Q.** The beveled edge of the thimble is divided into 25 equal parts, each space representing what?
- A. **1/1000 of an inch or .001”. (One thousandth of an inch.)**

TORQUE WRENCHES

- Bolts are springs that work by being stretched, put under a strain.
- When you tighten a bolt, the threads work to stretch the shank by wedging the end of the bolt away from the head.



TORQUE WRENCHES

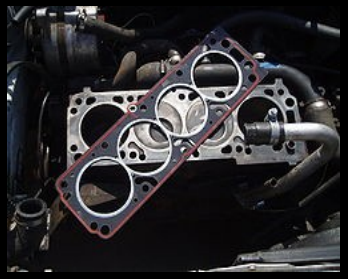
- A torque wrench is a tool used to precisely apply a specific torque to a nut or bolt.
- Originally designed to prevent over tightening bolts on water main and steam pipe repairs underground.

TORQUE WRENCHES

- Gasket surfaces need to be held together by force.
  - Gaskets that don't have adequate clamping force exerted will eventually blow.
  - Mating surfaces on either side do not provide enough grip to support it against combustion pressure.

TORQUE WRENCHES

- A torque wrench is used where the tightness of bolts and gaskets is crucial.
- Allows the operator to measure the torque applied to the fastener.
  - Matched to the specifications for a particular application.
- Permits proper tension and loading of all parts.



TORQUE WRENCHES

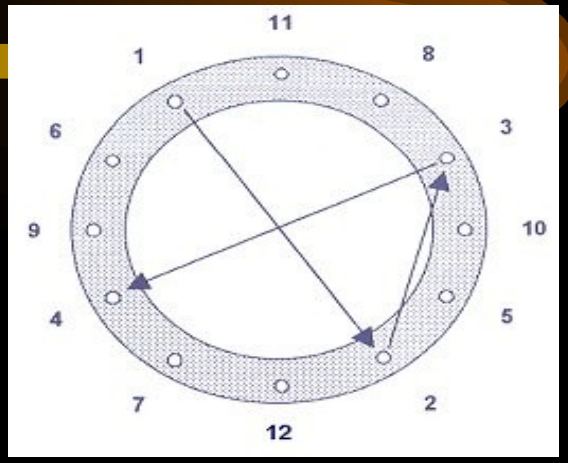
- Thread locking compounds such as Loctite have a lubricating effect.
- When using Loctite, cut back on the torque by 10% UNLESS the manual says to use Loctite on the fastener.

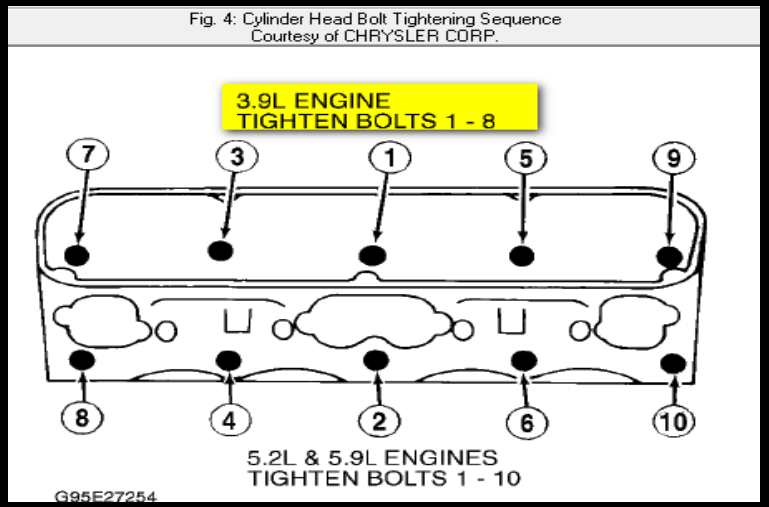
TORQUE WRENCHES

- You may see a demand along these lines:
  - "Torque down to X lbs/ft of torque, then turn an additional ¼ turn."
- Often find that for head bolts.
- When it calls for that, do it. Engineers have figured out that the method will be the most reliable way of achieving the necessary torque.

TORQUE WRENCHES

- When tightening down groups of bolts, go by the book.
- If no specified order, then work in a criss-cross pattern.
- For long pieces, start with the two screws closest to the center. Criss-crossing as you go.





TORQUE WRENCHES

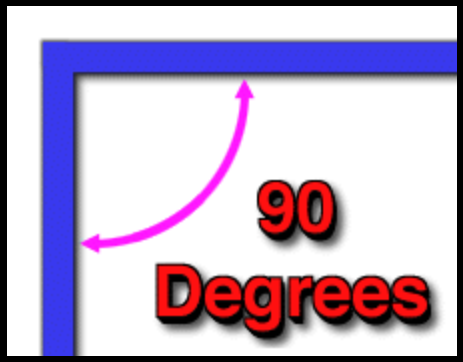
- Usually, it is better to approach max torque in two or three stages.
- If the instructions call for 22 lbs/ft.
  - Tightening pattern should be 12, then 18, then the final value.
- Then do a circuit around the edge at the highest torque value just to make sure you get them all.

TORQUE WRENCHES

- U.S. torque specs are usually spec'd in lbs/ft or lb/inches of torque.
- “Foot-pounds” used as a method of expressing torque all the time. It has become the usual method of expression.
  - Work is measured in ft/lbs
  - Torque is measured in lbs/ft, or lb/inches.

TORQUE WRENCHES

- A lb/ft of torque is leverage exerted by a 1lb weight hung at the end of a one-foot lever extending out at 90 degrees from the point of attachment.
- If the pull is exerted at less than 90 degrees the torque is correspondingly less.



TORQUE WRENCHES

- An lb/in of torque is a 1lb weight hung on a 1-inch lever.
- Lb/in are used to express small amounts of torque.
- You can convert directly by using a factor of twelve.
  - 10 lbs/ft x 12 = 120 lb/inches.
  - 96 lb/inches ÷ 12 = 8 lbs/ft.

TORQUE WRENCHES

- Two basic types:
  - Beam
  - Click

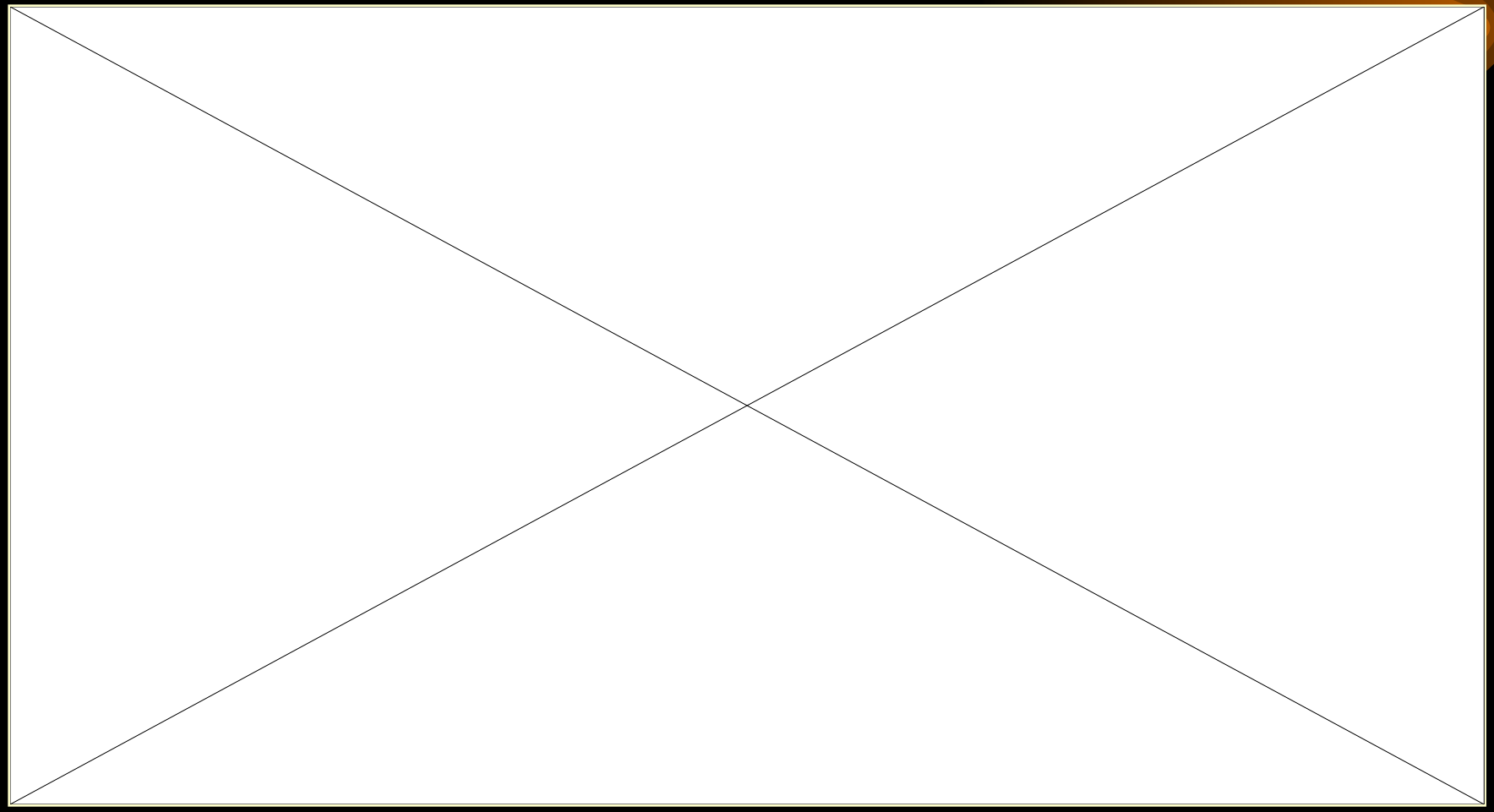
TORQUE WRENCHES

- Beam Type
  - The simplest torque wrench consists of a long lever arm between the handle and the wrench head.
  - Arm bends elastically in response to applied torque.
  - When the desired torque is reached the operator stops applying force.
  - Inherently accurate, and inexpensive.

TORQUE WRENCHES

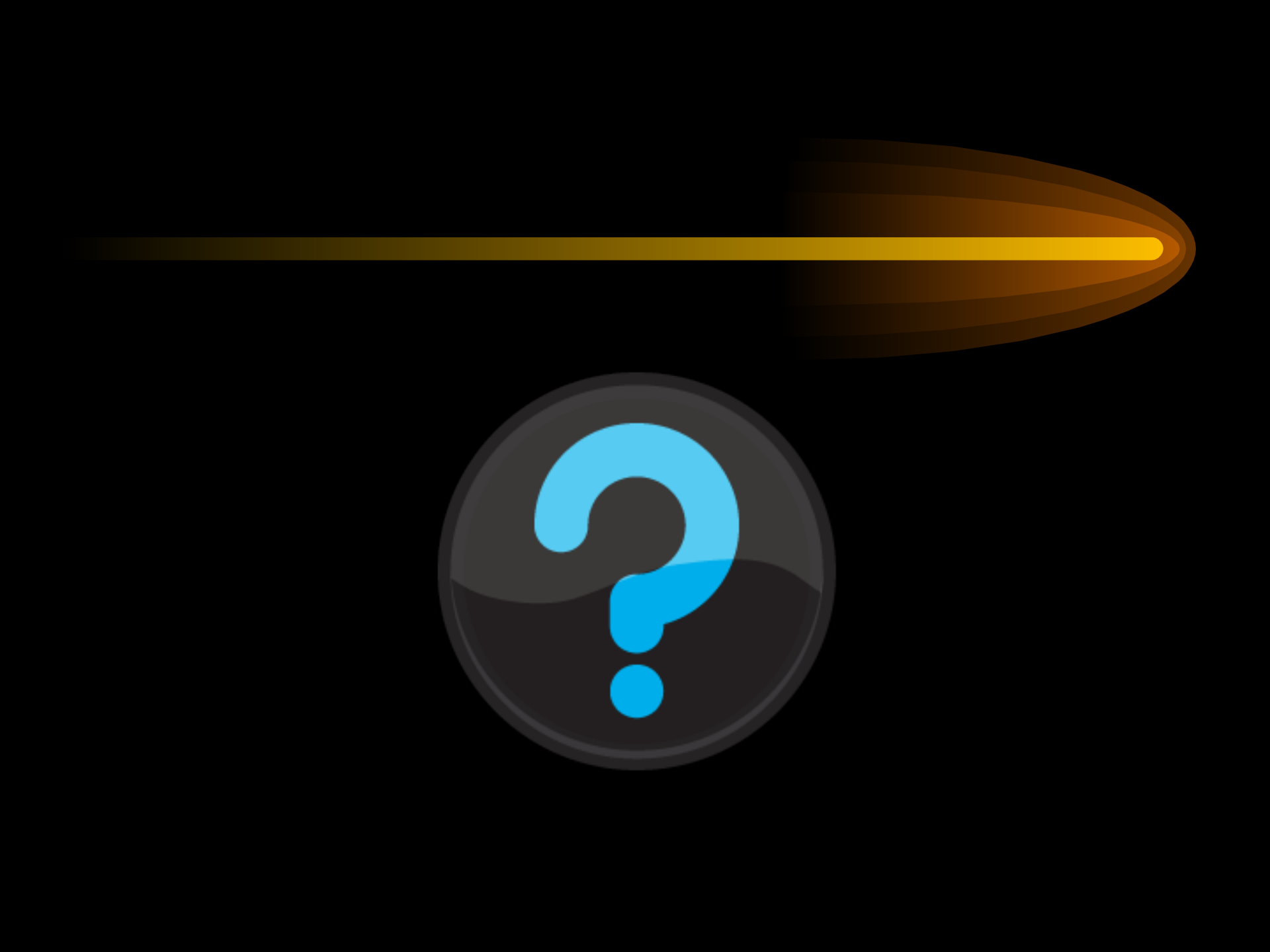
- Click Type
  - A more sophisticated method of presetting torque
    - Calibrated clutch mechanism.
  - The point where the desired torque is reached, the clutch slips, preventing additional tightening.
  - Advantage of this design:
    - Greater precision and a positive action at the set point.

TORQUE WRENCHES



Demonstration

Practical Application



Check on Learning

- Q. A torque wrench allows the operator to do what?
- A. **Measure the torque applied to the fastener so it can be matched to the specifications for a particular application.**
- **Q.** What are two basic and common type torque wrenches?
- A. **Beam and click types.**

Break!!!

Multimeters

- One of the most important debugging tool in any toolbox is a multimeter.
- A multimeter can measure:
  - Continuity, resistance, voltage and sometimes even current, capacitance, temperature, etc.

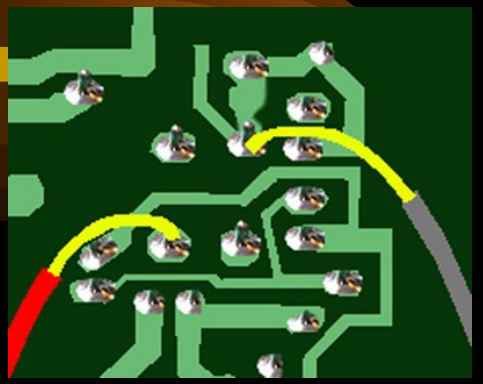
Multimeters

- Continuity. Continuity means, two things electrically connected.
- If two electronic parts are connected with a wire, they are continuous.
- If they are connected with cotton string, they are not: while they are connected, the cotton string is not conductive.

Multimeters

- Continuity testers usually have a buzzer which beeps.
- Useful when you want to poke at a circuit and need to focus on where the probes are instead of staring at the meter display.

Multimeters



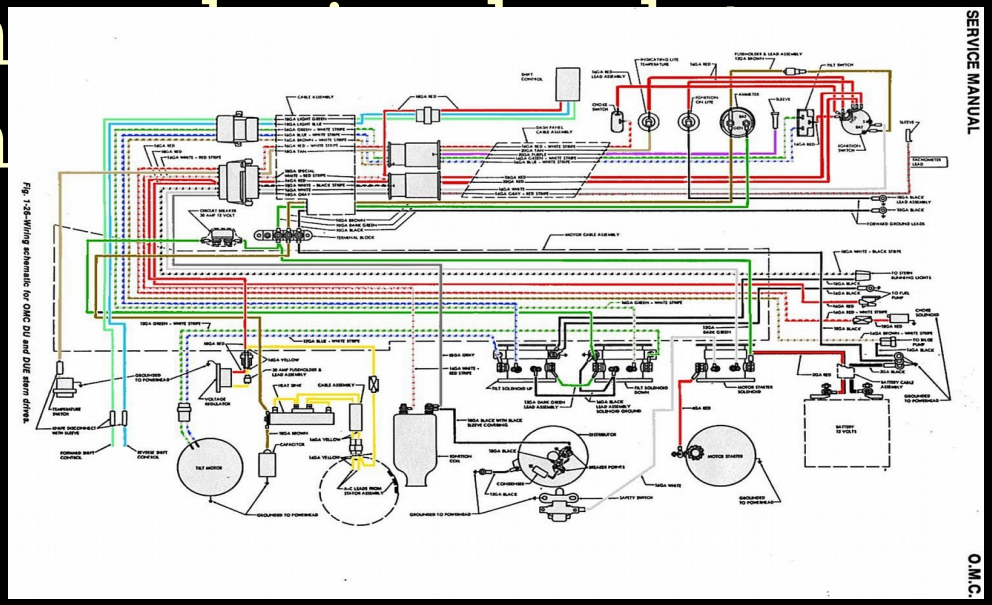
- Continuity tests are good for:
  - Determine if your soldering is good.
  - A *cold solder connection* will appear in actuality

Multimeters

- Continuity tests are good for:
- Determine if a wire is broken in the middle.
- It appears as if the cable is fine but inside the wires have been bent so much they eventually broke.

Multimeters

- Continuity tests are good for:
- Reverse-engineering or verifyin
schema



Multimeters

- You can only test continuity when the device you're testing is not powered.
- Continuity works by poking a little voltage into the circuit and seeing how much current flows, its perfectly safe for your device but if its powered there is already voltage in the circuit, and you will get incorrect readings.

Multimeters

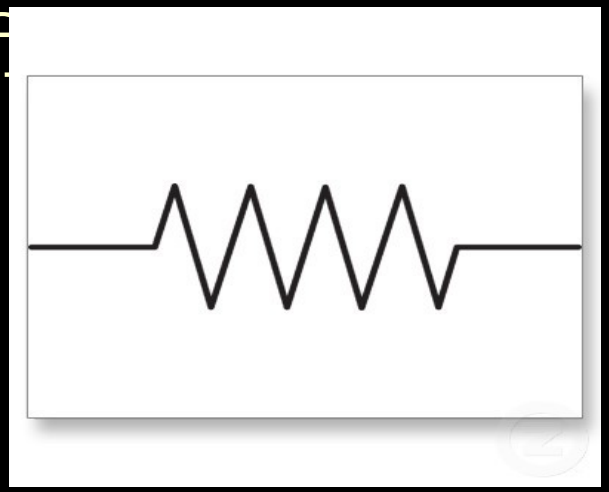
- Always test to make sure your meter by brushing the two tips together, and verifying you hear the beep.
- If no beep: maybe the battery is low or its not in the right mode.
- Continuity is non-directional, you can switch probes and it will be the same.

Multimeter

- Correct mode for continuity
  - “Sound Wave” icon
  - “OL” = no continuity
  - Display low Ohms: i.e. 004.7 = continuity

Multimeters

- Resistance.
- The characteristic that makes a component fight current flow.
- The bigger the resistance value (in ohms Ω) the more it fi



Multimeter

- Look for an ohm (Ω) symbol, if it’s a ranging meter there will be a bunch of subdivided modes

- If it’s auto-ranging there will be only one.

Multimeter

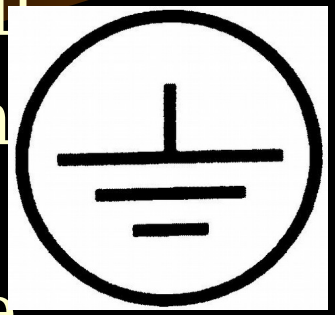
- Voltage testing is very common;
- Verify that your getting enough power:
  - When lights start to blink, or tractor hard to start?
  - What do you do, where should you start?

Multimeter

- You can only test voltage when a circuit is powered.
- If no voltage coming in then there will be no voltage to test.
- It must be hooked up or plugged in (even if it doesn't seem to be working).

Multimeter

- Voltage is always measured between two points.
- You must have two probes in the circuit
- If you need to test at a point or read th voltage at a certain location.
  - Negative probe at ground and the positive probe at the point you would like to measure.



Multimeter

- AC or DC.
  - Ensure you are testing for the right one.
- May require pressing a mode button or changing the dial.
- Two separate modes for AC and DC voltage.
  - Both will have a V but one will have two lines, one dashed and one solid (DC) and one with have a wave next to it (AC).

Demonstration

Practical Application

Check on Learning

- Q. What are a couple of reasons why you would perform a continuity test?
- A. **Making sure you have a good solder and that the wire is good (no break in the middle).**
- **Q.** What does the icon look like on the multimeter for a continuity test?
- A. **A soundwave.**

Summary

- T/O and T/E
- Control of Support and Test Equipment
- Equipment SL/3/TM Components
- Purpose and policy of the Marine Corps calibration control program
- Responsibilities of organizations holding TMDE, Calibrations Lab responsibilities
- Filing and disposition of Calibration and administrative remarks
- Several types of TMDE

BREAK!!!